DOCUMENT RESUME

ED 367 964 CS 011 642

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TITLE The Effect of Auditory Perception Training on the Reading Ability of Adult Poor Readers.
PUB DATE Apr 94
NOTE 23p.; Paper presented at the Annual Meeting of the American Educational Research Association (New Orleans, LA, April 4-8, 1994).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Adult Basic Education; Adults; *Auditory Perception; *Auditory Training; Community Colleges; Decoding (Reading); Low Achievement; Program Effectiveness; *Reading Ability; *Reading Achievement; *Reading Improvement; Two Year Colleges; Word Recognition
IDENTIFIERS *Community College of Rhode Island

ABSTRACT

A study examined the reading profiles of adult poor readers at a community college and investigated the effectiveness of auditory perception training in the reading ability of these adults. Subjects, 30 students from varied ethnic backgrounds attending the Community College of Rhode Island who were registered for a reading and study skills course, were placed into two equal sized groups based on the confines of the students' schedules and randomly assigned to one of two instructional conditions: a control group using a traditional metacognitive approach and an experimental group using a phonological skills approach based on the "Auditory Discrimination in Depth Program." Pre- and posttest results from a variety of measures were compared. The final subject group used for analysis consisted of 21 students. Results indicated that (1) subjects continued to be plagued by deficiencies in phonological processing and word attack skills; (2) knowledge of vocabulary was low; (3) subjects' reading comprehension scores were below the tenth percentile for students at the end of twelfth grade; (4) spelling was poor; however, (5) the experimental group made significant improvement on phonological tasks. Findings suggest that phonological skills do appear to be important to the reading process and that it is possible to teach adults phonological skills. Follow-up research is called for, and a longitudinal study would be helpful. Three tables and one figure are included. (Contains 21 references.) (RS)

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ED 367 964

THE EFFECT OF AUDITORY PERCEPTION TRAINING ON THE READING ABILITY OF ADULT POOR READERS

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Open door policies in community colleges have become revolving doors for underprepared students in recent years. As a response remedial programs in basic skills have been established (Boylan & White, 1987), although much variability exists in their content and philosophy. In addition, a wide range of reading abilities are found in these programs, making the task of determining effective teaching strategies difficult. Students who are enrolled in post-secondary programs present with a number of problems. They complain of:

slow reading rate - "It takes me so much longer than anyone else to read my assignments and I am only taking one course! I don't know what I will do when I start full-time."

poor comprehension - "I can read fine, but when I am done I can't remember a single thing!"

poor vocabulary knowledge - "There are so many words I don't know that by the time I look them all up I can't remember what the sentence was about."

poor spelling - "I have always been a poor speller. I never let anyone read my notes. Sometimes I can't even read them later."

Texts for post-secondary reading programs only address some of these complaints. Primarily they concentrate on the development of metacognitive skills. For example, they focus on getting meaning from reading the text through a five step strategy called SQ3R (survey, question, read, recite, and review) or a myriad of look-alike strategies. Fewer texts include vocabulary development, generally with a focus on developing an understanding through the use of context. Rarely, if ever, is

spelling addressed. It is assumed, therefore, that the major problem of adult poor readers is poor comprehension which can be improved primarily by the application of metacognitive strategies. Although numerous studies (Felton, Naylor and Wood,1990; Lefly, 1991; Pratt and Brady, 1988) have found evidence of poor phonological processing skills in adult poor readers, skills which are manifested in poor spelling and word attack performance, these skills are omitted by post-secondary texts and thus are not reflected in post-secondary reading programs. Nancy Lewkowicz (1987) explains the apparent lack of teaching word attack skills to adults. She reports that, "... the prevailing view toward upgrading such skills in students past the middle grades seems to be that the effort is impractical at best and perhaps even pernicious." This view, she feels, is based on a number of false assumptions about adult poor readers.

First of all, it is assumed that adults already have the phonological skills that lead to decoding. However, there is considerable evidence that, despite years of education, adult poor readers are still plagued by phonological awareness problems. Bruck (1990) found that adults who had been identified as dyslexic as children do not acquire appropriate levels of phoneme awareness regardless of age or reading level, although they eventually acquire appropriate levels of onset and rime awareness, a skill mastered by most normal readers at grade 3. In a similar population of adults, Felton, Naylor and Wood (1990) found that tests of phonological awareness, non-word reading, and rapid naming discriminated between groups of adult dyslexics and normal readers. The authors concluded, "Deficits in phonological processing comprise

the core cognitive deficits in adults with reading disability." In another study adult college students who were poor readers, but who had similar college achievement levels as non-dyslexic readers, still performed significantly lower than the non-dyslexic group on two phonemic awareness tasks (Kitz and Tarver, 1989). Finally, Pratt and Brady (1988) demonstrated, with their population of adults in adult basic education programs, that good and poor readers differed on similar phonological measures. They conclude, "Some students' deficits persist despite instruction in reading." In addition, studies with adult poor readers indicate similar profiles to children who are poor readers (Read, 1988). From a study with a prison population, Read found that adult poor readers strongly resemble poor readers in elementary school in the areas of short-term memory and decoding skills. Second, an analysis of phonological abilities is avoided because it is assumed that these skills are not important to the reading process. Evidence to refute this assumption is abundant in the literature. The evidence falls into three areas of support: correlation, prediction, and training. A high **correlation** between reading ability and phonological awareness has been established. Isabelle Liberman (1973), a late, major researcher in this area, reported a strong correlation between reading ability and phoneme segmentation. In her now famous tapping task, where a child is required to tap out the number of phonemes she hears in a spoken word, results have shown that no child in the top third of the first grade class had failed the tapping task before reading instruction began, whereas one-half of the children in the lower third of the class had failed it before the beginning of reading instruction. Bradley and Bryant

(1991) tested preschool children on a rhyming task and demonstrated that rhyming scores proved to be reliable predictors of reading ability.

Phonological awareness has also been found to be the best **predictor** of reading success in preschool children. Stanovich, Cunningham, and Cramer (1984) investigated the variety of phonological tasks being used in predictive studies in order to determine how much of the predictive power of the phonological tasks is due to phonological ability or extraneous cognitive processes. Ten different phonological awareness tasks were administered to a group of kindergarten children whose reading ability was assessed at the end of first grade. To their surprise, they found that all seven of the nonrhyming measures (ceiling effects were exhibited on the three rhyming tasks) correlated with first-grade reading more strongly than did a standardized IQ test.

Finally, **training** studies that explicitly teach phonological awareness skills show long lasting effects with children. Bradley and Bryant (1991), in a summary of their present work investigating phonological skill before and after learning to read, cite a longitudinal study training 5 and 6 year olds who had low scores on phonological tasks. The children were given 40 ten minute training sessions spread over 2 years. The children were retested when they were 8-9 years old. Even with I.Q. and age as covariates, the trained children were 8-14 months ahead of the control group in reading and 10-23 months ahead in spelling. Another similar longitudinal study was carried out by Lundberg, Frost, and Petersen (1988). The children in this study, however, had no reading training while they were receiving their phonological

training. Still the results were similar; phonological training during preschool had a facilitating effect on subsequent reading and spelling acquisition through grade 2.

The third and final assumption states that if adults don't have adequate phonological skills by now it is too late to teach them, or as adults they are unable to learn them. Evidence to refute this assumption is scarce. In a review of the literature focusing on college students with learning disabilities, Hughes and Smith (1990) reported that only about 33 articles published over a 20 year period were data-based and reported academic and cognitive treatment. They state, "Empirical articles dealing with the effectiveness of treatment approaches are nonexistent." One study, perhaps published too late for Hughes and Smith's survey, did present results of a training study with learning disabled college students. The participants in Guyer and Sabatino's (1989) study were 30 college students who had been identified as LD by their high schools or the university they attended. They were divided into 3 groups - a control receiving no training, a second group receiving a modified Orton-Gillingham approach to reading, and a third group whose training consisted of nonphonetic based instruction in reading. Although the number of hours of training per week is unclear in the article, the program lasted 5 weeks. Pre and post test results showed significantly more progress was made by the group receiving the modified Orton-Gillingham approach. Unfortunately, no specific data were provided on phonological abilities, even though the Orton-Gillingham approach uses a phonetic approach. The definition of learning disability and the measurements used to define improvement also may be a matter of dispute among other researchers.

The prevailing view which considers the teaching of word attack skills to adults as "impractical and pernicious" (Lewkowicz, 1987) appears to be intuitively-based rather than empirically- based. The present research study, in an attempt to help build an empirical base, has two objectives: 1) to examine the reading profiles of adult poor readers at a community college and 2) to investigate the effectiveness of auditory perception training on the reading ability of these adults.

Methods:

The participants in the study were 30 students attending the Community College of Rhode Island who were registered for a Reading and Study Skills course. They were all self-referred. Most had long histories of difficulty with reading. On the *Comparative Guidance and Placement Test* (CGP) administered as a screening test upon entrance to the course, they placed at the 17th percentile or below. They were of mixed gender and varied ethnic backgrounds. All were native speakers of English. Ages ranged from the typical college freshman of eighteen to returning students of forty and older. Most were high school graduates or had completed a GED program. They were predominately from middle to lower socioeconomic backgrounds.

A nonequivalent control group design was implemented. The placement of students into two equal size groups was determined by the confines of the student's schedule. The groups were then randomly assigned to one of two instructional conditions: control = traditional metacognitive approach; experimental = phonological skills approach. The control group used *College Reading and Study Skills*, 5th

edition as their primary text. The text focuses on metacognitive reading and study skills commonly taught in college reading programs. The experimental instruction group received training with the *Auditory Discrimination in Depth Program*, a multisensory program structured to develop the auditory-perceptual skills basic to reading and spelling. The A.D.D. Program was chosen for several reasons. First, it is a structured program with a solid rationale for the order of presenting phonological tasks. Too often linguistic programs are taught in a haphazard fashion by instructors not familiar with this rationale (Chall, 1967). Second, it involves an integration of sensory clues from the eyes, the ears, and the mouth. Accepted methodology for teaching learning disabled students includes the integration of the senses. Third, it is designed to provide experience at a level below that at which most phonics or reading programs begin (Lindamood, 1975). This is important for adult students who may have had unsuccessful experiences with linguistic programs in the past. Finally, it provides instruction for adults without the stigma of immature vocabulary. Each group spent two hours per week with the same instructor.

The following measurements were obtained from all participants:

1. *Peabody Picture Vocabulary Test - Revised* (*PPVT-R*) - test for vocabulary knowledge; words given orally, examinee chooses correct response from 4 drawings. Does not require a verbal response.

2. *Degrees of Reading Power, Form F3* (*DRP*)- a cloze measurement of reading comprehension commonly used in college reading programs.

3. *Lindamood Auditory Conceptualization Test* - (*LAC*) measures ability to

perceive compatibility between the identity, number, and order of sounds in spoken patterns and the visual units used to represent them.

4. Word identification subtest of the *Woodcock Johnson Achievement Test* - requiring pronunciation of real words in isolation.

5. Word attack subtest of the *Woodcock Johnson Achievement Test* - requiring pronunciation of psuedowords in isolation.

6. Spelling tests of real and psuedowords requiring a written response.

At the conclusion of the semester all students were posttested using the same pretest measures. Results were analyzed quantitatively. Scores from twenty one of the thirty original participants were used for the analyses. Nine students were eliminated due to incomplete data. One missing score from the control group on post-test word attack was replaced by the mean for that subtest. Only variables with sufficient data were used to evaluate the effectiveness of training (LAC, word identification, and word attack).

Results:

An examination of the reading profiles of the participants reveals that they continue to be plagued by deficiencies in phonological processing. None of the participants received an acceptable score, for adults, of 99 on the *Lindamood Auditory Conceptualization Test*, ($\underline{M}$ = 67.5, SD = 19.30). There was much variability in the obtained scores. Scores ranged from a low of 30 to a high of 92. The mean is equivalent to the acceptable minimum score for students in the second half of second grade. Another indication of phonological processing deficiency was the poor

performance on the word attack subtest. The mean (M = 19.5, SD = 4.78) represents a grade equivalent of 5.5. In comparison, the mean on the word identification subtest (M = 48.09, SD = 3.67) represents a grade equivalent of 8.2, which seems to indicate that the participants have acquired compensating visual strategies to help them identify familiar words, although their knowledge of sight words is still quite low. As the words in the word identification list became unfamiliar, the same ineffective strategies were applied as with the psuedowords presented on the word attack subtest. Knowledge of vocabulary as demonstrated by the *PPVT-R* was also low. The mean (M = 129, SD = 11.74) is equal to the tenth percentile and an age equivalent of 13-4. The *PPVT-R* scores and the word identification scores, which represent knowledge of sight words, were both significantly correlated with the *DRP* (PPVT-R: $r = .73$, $p < .01$ and word identification: $r = .58$, $p < .01$), thus illustrating their importance to comprehension. Reading comprehension scores on the *DRP* were equivalent to below the tenth percentile for students at the end of 12th grade. Students who score at this level only show a proficiency of independent reading of children's magazines. Reading comprehension scores on the screening test, *CGP* - a timed test, also placed the students at below the 10th percentile. As with the *DRP*, word identification was significantly correlated with *CGP* ($r = .45$, $p < .05$). Spelling of both real words and psuedowords was poor. Significant correlations were found to support the link between spelling and word attack ($r = .83$, $p < .01$) and spelling and word identification ($r = .76$, $p < .01$).

Within group pre- and post-test scores, analyzed by paired *t* tests for each

group, showed significant improvement on several measures (see Table 1). Specifically, the experimental group using the A.D.D. program made significant improvement on the *LAC* test, ($t(10) = -3.96$, $p < .01$); word identification, ($t(10) = -2.46$, $p < .05$); and word attack, ($t(10) = -3.40$, $p < .01$). The control group, using metacognitive strategies, also made significant improvement on the LAC test, ($t(9) = -4.33$, $p < .01$).

The effectiveness of the auditory perception training (A.D.D.) was analyzed using independent *t* tests based on the means of the differences. This method was chosen due to significant pretest group differences on two of the three variables to be computed (word identification and word attack). Significant differences between the groups were found on LAC and word attack (see Figure 1). The experimental group, receiving the auditory perception training, performed significantly higher than the control group on the LAC test ($t(19) = 2.78$, $p < .01$) and on word attack ($t(18) = 2.14$, $p < .05$) (see Table 2).

DISCUSSION:

The results of this study likewise refute the three false assumptions noted by Lewkowicz (1987). First, it is clear from the scores obtained by the adult poor readers in this study that these adults have not acquired the phonological skills that lead to effective decoding. Lindamood (1975) has stated that 30% of all normal populations have moderate to severe phonological awareness problems. In this study, however, ninety percent of the students exhibited moderate to severe problems. The students investigated were sampled from a non-normal population - poor readers;

therefore, it is not surprising that a much higher percentage of moderate to severe phonological problems was found. Second, the results of this study indicate that phonological skills do appear to be important to the reading process. The means obtained on both a timed and a cloze reading comprehension test place these adult poor readers below the 10th percentile. Other research has shown that the patterns distinguishing learning disabled college students from non-learning disabled college students are heavily related to language proficiency. Learning disabled students with the same cognitive abilities as non-learning disabled students have significantly poorer reading, writing, and speaking skills (Morris and Leuenberger, 1990). Finally, the results indicate that it is possible to teach adults phonological skills. The experimental group using the A.D.D. program made significant improvement on phonological tasks (LAC, word attack, and word identification). It was especially encouraging that the decoding of both non-words and real words significantly improved for this group. The LAC test primarily focuses on the decoding of non-words thus it would seem that these skills have transferred to the ability to decode real words. Similar results were obtained by Gittelman and Feingold (1983) in a study with 10 year olds. Although the control group also showed significant improvement on the LAC test, the gains were not as dramatic and possibly can be attributed to a practice effect. The experimental group made significantly more improvement on two phonological tasks (LAC and word identification) than the control group when analyzed by independent *t* tests using means of the differences. Independent *t* tests using mean scores were not sufficient to reveal the gains made

by the experimental group due to significant pretest differences. Unfortunately, my instincts as a teacher interfered with my knowledge as a researcher of the need to achieve randomness in my groups. Instinctively I encouraged those students most in need of phonological help to participate in the experimental group.

An unexpected outcome of this study was the emergence of four patterns of performance on the reading and language tasks administered (see Table 3). In pattern 1, the performance on all the measures was low, and the gap between word attack scores and word identification scores was only 1-2 grade equivalents. A small number of students fell into this group. Their progress on all reading and language tasks was very slow. In pattern 2, the group with the largest representation, scores varied on many of the measures. Nonsense spelling was extremely low. The gap between word attack and word identification was 3-4 grade equivalents. These students may be the most like normal young readers. Good progress was made with this group. Future studies may select this population due to its demonstrated ability to achieve results over a short period of time. Pattern 3 and pattern 4 were rare. In pattern 3, all scores were high. The highest score obtained on the PPVT-R and the DRP was found here; however, nonsense spelling was very low. A surprising finding was the gap between word attack and word identification - a gap of 7-8 grade equivalents. The student who showed this pattern of performance made very slow progress in the A.D.D. program. In fact, he quit the program due to his slow progress and the fact that what he was learning was "messing up" what he was able to do in reading. In pattern 4, high scores were obtained on the LAC test, nonsense spelling,

and regular spelling. The gap between word attack and word identification was approximately the same as in pattern 2, but the direction of the difference was reversed; the score on word attack was higher than the score on word identification. In addition, the comprehension score was quite low. These students are similar to hyperlexics, who can decode well but have difficulty comprehending what they have read. These students would probably benefit more from metacognitive strategies than decoding strategies. Although primarily speculative, these patterns of performance may help the adult educator identify the reading problems of the adult readers for whom they must provide the best remediation.

CONCLUSION:

As a pilot study, this research has added to the sparse literature on adults' ability to acquire phonological skills. In follow-up research, improvement in methodological design would help to strengthen the interpretation of the results specifically, the addition of a no treatment control group. Also, a longitudinal study could provide further evidence of the long-term effects of phonological training on the academic achievement of poor readers who are college students.

TABLE 1

PRE-TEST AND POST-TEST MEANS (SD) OF PHONOLOGICAL MEASURES

	CONTROL GROUP			EXPERIMENTAL GROUP		
	LAC	**WORD ATTACK**	**WORD IDENT.**	**LAC**	**WORD ATTACK**	**WORD IDENT.**
PRE-TEST	*M* = 71.40 SD = 17.02	*M* = 22.56 SD = 4.03	*M* = 50.10 SD = 2.48	*M* = 64.18 SD = 21.38	*M* = 16.45 SD = 3.60	*M* = 46.09 SD = 3.56
POST-TEST	*M* = 77.70 SD = 18.30	*M* = 23.00 SD = 2.92	*M* = 50.20 SD = 2.20	*M* = 89.64 SD = 8.58	*M* = 20.18 SD = 5.46	*M* = 47.73 SD = 2.57

TABLE 2

POST-TEST MEANS (SD) OF MEAN DIFFERENCES

	CONTROL GROUP	EXPERIMENTAL GROUP
LAC DIFFERENCE	*M* = 6.30 SD = 4.60	*M* = 25.45 SD = 21.33
WORD ATTACK DIFFERENCE	*M* = 0.44 SD = 3.13	*M* = 3.73 SD = 3.64

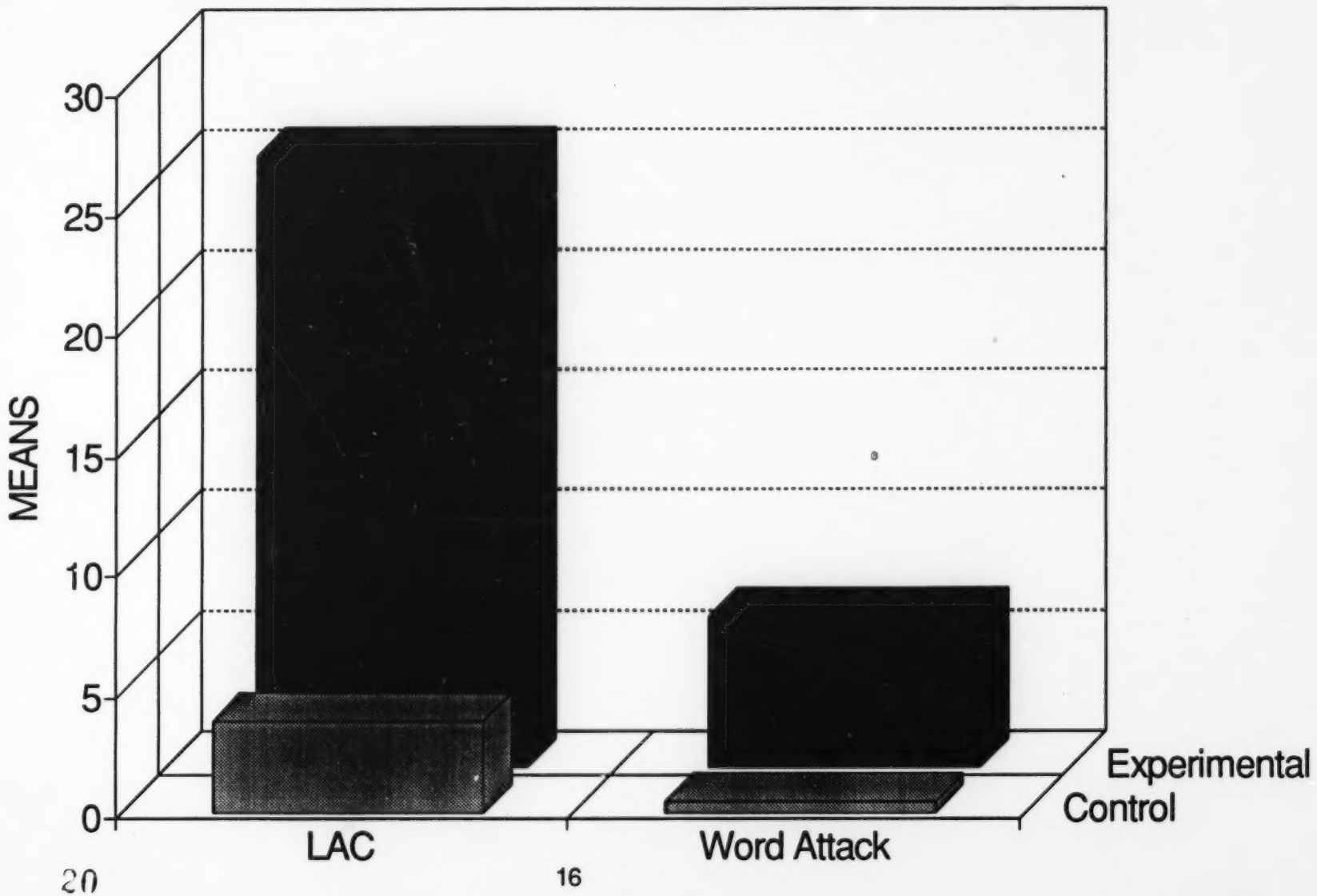
TABLE 3

PATTERNS OF PERFORMANCE ON READING AND LANGUAGE TASKS

PATTERN	PPVT-R	LAC	NONSENSE SPELLING	WORD ID	WORD ATTACK	REGULAR SPELLING	COMPRE-HENSION
#1	LOW 13.0 A.E.	LOW 37	LOW 3 / 10	5.4 GAP	4.1 1 - 2 G.E.	LOW 10 / 36	LOW 37 DRP
#2	13.10 A.E. 16.10 A.E. 17.40 A.E.	63 67 63	0 1 / 10 1 / 10	5.4 7.1 5.1 GAP	2.0 3.8 1.9 3 - 4 G.E.	2 / 36 22 / 36 10 / 36	66 50 47
#3	HIGH 33.6 A.E.	LOW 69	LOW 3 / 10	HIGH 11.9 GAP	LOW 4.1 7 - 8 G.E.	LOW 4 / 36	HIGH 68
#4	15.4 A.E.	91	7 / 10	11.9	16.9	30 / 36	33

FIGURE 1

PRE-TEST/POST-TEST MEAN DIFFERENCES



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